which remain constant. Visual and photographic observation of the wave forms from many instruments shows that the overtones are certainly not harmonic in the sense commonly understood, and, moreover, the different notes in the scale of any one instrument are not similar in their composition. While a tone is being given with no variation that the ear detects, the partials are seen to be rapidly varying in phase, or intensity, or both. A slight change in the manner of blowing a wind instrument, which to the ear results merely in a change of loudness, completely alters the form of the wave. Instead of a characteristic series of harmonics, it seems that each instrument possesses rather a characteristic tone or tones, which is of constant pitch for all notes of its scale. This theory has been recently advanced by Meissner, from experiments with the phonograph. Such a characteristic tone for the flute would seem to be consistent with the rather anomalous conditions imposed by the stopper in the head-joint of the instrument.

The inadequacy of the former theory is clearly shown by the failure of many attempts to synthetically reproduce the characteristic tones of orchestral instruments, such as those by Helmholtz, Koenig and more recently by the Telharmonium.

A complete reply to the second part, "Why," of the question propounded for consideration has, by no means been given; but the first part of the question, we feel, has been conclusively answered: the effect of material upon tone quality of wind instruments certainly is not a fable.

DAYTON C. MILLER
CASE SCHOOL OF APPLIED SCIENCE

REPORT OF COMMITTEE ON STANDARDS OF AMERICAN UNIVERSITIES[1]

THE Committee on Standards of American Universities begs leave to report as follows:

[1] Amended and adopted by the National Association of State Universities, Washington, D. C., November 17, 1908.

The committee originally was appointed at a session of this association in Washington, D. C., November 13, 1905, and consisted of Presidents Bryan, of Indiana, James, of Illinois, and MacLean, of Iowa, Chairman. The resolution under which the committee was appointed reads:

> That a committee be appointed that shall report later to this body upon standards for the recognition of American universities and upon standards for the recognition of the A.B. degree and higher degrees.

The committee was unable to meet in 1905–6. The chairman presented a memorandum for a partial report at the session of the association, November 12–13, 1906, in Baton Rouge, La., and the committee was continued. At a meeting of the association in 1907, the committee asked for further time. The request was granted and at the special meeting of the association in Chicago in February, 1908, President Baker, of Colorado, was added to the committee. The committee has had several extended sittings and unites in the following statements and recommendations:

Your committee believes that there are certain clearly marked tendencies or forces at work in our American society toward a development, at no distant date, of a typical institution of learning, which we may not improperly call the Standard American University.

This institution will, for an indefinite time, include as an important part of its organization what we may call a Standard American College, with a four-year curriculum, with a tendency to differentiate its parts in such a way that the first two years shall be looked upon as a continuation of, and a supplement to, the work of secondary instruction, as given in the high school, while the last two years shall be shaped more and more distinctly in the direction of special, advanced or university instruction, rising gradually into the advanced work of the graduate school.

The Standard American University will also include as a distinct department the graduate school or philosophical faculty.

It will also include as organic parts of the institution in its fully developed form, vari-

ous professional schools such as law, medicine and engineering.

Present tendencies point, in our opinion then, to a definite differentiation in the work of the college at the close of the sophomore year toward university work in the real sense. If these views are just, we suggest the following formulation of principles underlying the organization of such an institution and we may define the Standard American University to be an institution: (1) Which requires for admission the completion of the curriculum of a standard American high school with a four years'[1] course, or in other terms, the completion of a course which will enable the pupils to offer not less than fourteen five-hour units, or equivalent; (2) which offers in the college of literature and science two years of general or liberal work completing or supplementing the work of the high school; (3) which offers a further course of two years so arranged that the student may begin work of university character leading to the bachelor's degree at the end and reaching forward to the continuation of this work in the graduate school or the professional school; (4) which offers professional courses, based upon the completion of two years of collegiate work, in law, or medicine or engineering; (5) which offers in the graduate school an adequate course leading to the degree of doctor of philosophy.

It is recommended that this association recognize any institution, in whole or in part, doing work of this grade as, in so far, doing work of university quality.

In recommending that university work begin with the junior year of the college and that the professional schools be based on the first two years of college, the report is in line with present tendencies. It is in accord with the growing belief that the work of the last two years of college should be organized into groups that aim at more definite results, and lead to greater efficiency. But this is only the first of many problems. We are facing questions of the time beyond the junior year for attaining the Ph.D. degree, of adjusting the scheme of counting the last two years toward both arts and professional degrees, of the place of the A.B. degree, of the age when the period of general education should end, and of a possible reorganization of elementary and secondary education. But these questions are not ready for solution and hardly belong to the work of the committee at the present time.

In accordance with the foregoing definition of the Standard American University, it is recommended that the following standards be set up:

1. *Time Requirement for the Bachelor's Degree.*—Not less than sixty year-hours, or twelve units, of collegiate work shall be required for the bachelor's degree.

2. *Qualifications of Teachers.*—It is expected that the teacher in the high school shall have the bachelor's degree, or show evidence of equivalent attainment, and it is recommended that he have the master's degree. As a rule, the professors of all ranks in the collegiate work shall have the degree of doctor of philosophy, or its equivalent. The professors giving instruction in graduate work are expected to show, in addition to the possession of a doctor's degree, or its equivalent, their scholastic ability by successful research and publication, and above all, they must have demonstrated that they have power as teachers to inspire the students with zeal for research. Indeed, it is understood that all the teachers should possess the power of imparting knowl-

[1] The definitions of *standards* in terms of time are used as a matter of convenience, but there shall be due opportunity in individual cases to show equivalents. In the definitions of *units* for collegiate entrance requirements, it is recommended that those now current in the North Central Association of Colleges and Secondary Schools, the Association of Colleges and Preparatory Schools of the Middle States and Maryland, the New England Association of Colleges and Preparatory Schools, the Association of Colleges and Preparatory Schools of the Southern States, the College Entrance Examination Board, the New England College Entrance Certificate Board and the National Conference Committee of the Associations of Colleges and Preparatory Schools, and those formulated by associations of experts, and accepted by the above bodies, be recognized.

edge and of character building. In addition, the professors in the professional schools should give evidence of doing investigative work and those in technical schools, evidence of the power of practical research.

3. *Institutional Facilities.*—(1) There should be adequate general and departmental libraries, with (*a*) sufficient number of duplicate books for purposes of undergraduate instruction, (*b*) where graduate work is offered, books, monographs and other material for purposes of research. (2) There should be modern laboratories[2] and apparatus, with (*a*) sufficient supervision for undergraduate teaching, (*b*) where graduate work is offered, research laboratories.

4. *Time Units for Degrees.*—Institutions providing for advanced work shall require three years or nine five-hour units[3] from the beginning of the junior year for the degree of master of arts, or five years or fifteen five-hour units for the degree of doctor of philosophy, and with work in residence.[4]

5. *Scope of Curriculum.*—To be a standard university an institution shall be equipped to give instruction leading to the degree of doctor of philosophy in at least five departments, according to the standard prescribed in this report, and shall have at least one university professional or technical school. The term *university professional* or *technical school* shall not be applied to any professional or technical school that does not require the two years' collegiate training for admission.

Your committee further recommends as follows:

Provision for Recognition of Other Institutions.—Provision shall be made whereby institutions other than state universities may be freely welcomed to adhere to the standards set up by this association.

Committee on Standards

1. There shall be a standing committee on standards of five members, of which the honorary vice-president of this association (the United States Commissioner of Education) shall be one. The committee on standards may invite into conference representatives of other educational organizations interested in formulating standards.[1]

2. When institutions within or without the association seek to adhere to the standards, said committee shall have the power to recommend to this association for recognition, institutions meeting these standards and may, after report to this association and its approval, issue certificates to institutions, to departments and even to individual instructors.

3. The committee may employ assistance upon the approval of the executive committee, the compensation for such assistance, together with necessary traveling expenses, to be paid from a fund created for the purpose, raised by apportionment among the members of this association in accordance with the sum expended by each institution for salaries.

4. The committee or their representative

[2] In the use of the term *laboratories*, not only those for the material sciences with opportunity for proper field work are included, but also museums and proper laboratories for the historical sciences and philosophy.

[3] The unit in the high school is reckoned usually from a period of forty minutes, with twenty periods in a week. The units in the college or university are reckoned from a period of fifty or fifty-five minutes, with fifteen periods in a week, the differences in length of periods and in number of periods a week being due to the maturity or training of the student.

[4] The units shall not necessarily be schedule hours, but their equivalent, and shall include credit for research and thesis work. It is of course understood that from the beginning of the junior year, there is the adoption of a group system suggested by the honor schools in English universities, or the separate faculties in the German universities, and that the kind of instruction contemplates investigation—in short, science with power—as the purpose. It is the intent that the cultural atmosphere shall pervade the work of the student who begins specialization and that something of the spirit of discovery and the earnestness it brings shall affect the cultural temper.

[1] Committee is made up of the following members: President Jacob Gould Schurman, *chairman, ex-officio;* Dr. Elmer E. Brown, United States Commissioner of Education, *ex-officio;* President William Lowe Bryan, President James H. Baker, President Edmund J. James, President George E. MacLean, *secretary.*

may, when invited, visit an institution applying for recognition, the expense of such visitation to be borne by the institution concerned.

5. In making recommendations as to institutions, the committee on standards shall give great weight to the character of the curriculum, the efficiency of instruction, the scientific spirit, the standard for regular degrees, conservatism in granting honorary degrees, and the general tone of the institution.

6. This committee shall further be charged with the duty of correspondence with institutions and governments at home and abroad to gain proper recognition of graduates and students from these recognized institutions, departments and individuals.

7. The committee on standards shall report further upon standards and classification and shall cooperate as far as possible with a similar committee of the Association of American Universities.

Publication of Standards and List of Institutions.—This association shall publish the standards that have been adopted and, from time to time, the list of institutions adhering to them.

William Lowe Bryan,
James H. Baker,
Edmund J. James,
George E. MacLean, *Chairman,*
Committee

THE SEVENTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY

The American Committee for the Seventh International Congress of Applied Chemistry, which meets in London, from May 27 to June 2, 1909, has been completed and a list of the members follows. The fee for membership for men at the approaching meeting is one pound and for women fifteen shillings. It is suggested that subscription for membership be sent to the chairman of the American committee or to chairmen of the sub-sections, and that five dollars be sent for men's memberships in order to cover the necessary expense for postage, etc., which has been and will be incurred. The chairman of the committee or the chairmen of the sub-committees will undertake to forward subscriptions to the London committee, or members may send their checks to Mr. Thos. Tyrer, treasurer, 10 Cromwell Crescent, London, S. W., England. In the latter case it is requested that notice be sent to the chairman of the American committee. Titles of papers, together with abstracts, should be sent first to the chairman of the section to which the papers belong, and he will transmit them to the chairman of the American committee for entry and transmission to London. H. W. Wiley

List of members forming the American committee

Harvey W. Wiley, chairman, American Committee, Washington, D. C.

Members of the Advisory Committee of Honor

Dr. John J. Abel, president of the American Society of Biological Chemists, Johns Hopkins University, Baltimore, Md.

Mr. Edward G. Acheson, president of the American Electro-chemical Society, International Acheson Graphite Company, Niagara Falls, N. Y.

Dr. M. T. Bogert, president of the American Chemical Society, Columbia University, New York City.

Dr. C. F. Chandler, former president of the American Chemical Society, head of the chemical department of Columbia University, Columbia University, New York City.

Dr. Frank W. Clarke, former president of the American Chemical Society, and honorary member of the English Chemical Society, Geological Survey, Washington, D. C.

Dr. Wm. H. Nichols, chairman of the General Chemical Company, 25 Broad Street, New York City.

Dr. Ira Remsen, president of the Johns Hopkins University, former president of the American Chemical Society, Johns Hopkins University, Baltimore, Md.

Section 1. Analytical Chemistry

Chas. Baskerville, chairman, The College of the City of New York, New York City.

T. L. Briggs, 25 Broad Street, New York City.

Louis Munroe Dennis, Cornell University, Ithaca, N. Y.

Parker C. McIlhiney, 7 East 42d Street, New York City.

Henry P. Talbot, Massachusetts Institute of Technology, Boston, Mass.

Fletcher P. Veitch, Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.

Percy H. Walker, Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.

Section 2. Inorganic Chemistry

J. D. Pennock, chairman, The Solvay Process Company, Syracuse, N. Y.